Appl. No. 10/727,846
Examiner: DAHIMENE, MAHMOUD, Art Unit 1765
In response to the Office Action dated November 2, 2005

Date: January 27, 2006
Attorney Docket No. 10113381

REMARKS

Responsive to the Office Action mailed on November 2, 2005 in the above-referenced application, Applicant respectfully requests amendment of the above-identified application in the manner identified above and that the patent be granted in view of the arguments presented. No new matter has been added by this amendment.

Present Status of Application

Claims 1-20 are pending. Claim 4 is rejected under 35 U.S.C. 112, second paragraph. Claims 1, 2, 11 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003 and Yoo et al (US 6,033,969). Claims 3, 4, 13 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003, Yoo et al and Akatsu et al. Claims 7-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003, Yoo et al and Ajmera et al. Claims 5 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003, Yoo et al, Akatsu et al and Fuller et al. Claims 6 and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003, Yoo et al, Akatsu et al and Kim et al. Claims 17-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003, Yoo et al, Akatsu et al and Ajmera et al.

In this paper, claims 1 and 13 are amended to recite a step of etching the exposed substrate to form a recess region in the substrate. Support for this limitation can be found on page 6, lines 26-27. Claim 4 has been amended according to the suggestion of the Examiner to correct the preamble.

Reconsideration of this application is respectfully requested in light of the amendments and the remarks contained below.

Rejections Under 35 U.S.C. 103(a)

Claims 1-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of RD 441003 and Yoo et al and, in the case of claims 3-10 and 13-20, one or more of Akatsu et

al, Kim et al, Ajmera et al and Fuller et al. To the extent that the grounds of the rejections may be applied to the claims now pending in this application, they are respectfully traversed.

MPEP 2142 reads in part:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In connection with the third criteria, MPEP 2143.03 goes on the state:

> To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

As amended, independent claim 1 recites a step of patterning the masking layer to form at least one opening therein to expose the substrate and ***etching the exposed substrate*** to form a recess region in the substrate. Independent claim 13 recites a step of successively etching the boron silicate glass layer, the silicon nitride layer, and the pad oxide layer to form at least one opening therein to expose the substrate and ***etching the exposed substrate*** to form a recess region in the substrate. In both claims 1 and 13, the recess region is then oxidized to form a first oxide layer thereon to round the top corner of the recess region, and successively etching the first oxide layer and the substrate under the opening to form the trench in the substrate.

In other words, in claims 1 and 13, the substrate is first etched to form a recess, and is further etched to form a trench after oxidation of the recess. These steps are illustrated in Figs. 2a-2d and described on pages 6-7 of the application, wherein substrate 200 is exposed by patterning the masking layer 205 and a recess region 212 is formed therein by an etching process. The recess region 212 is oxidized to form a thin oxide layer 214 and then the thin oxide layer 214 is etched through to form a trench in the substrate 200.

Whether taken alone or in combination, the cited references fail to teach or suggest etching the exposed substrate to form a recess region in the substrate and oxidizing the recess region to form a first oxide layer thereon to round the top corner of the recess region, and successively etching the first oxide layer and the substrate under the opening to form the trench in the substrate, as recited in claims 1 and 13.

The rejections rely upon a combination of RD 441003 and Yoo et al to teach the steps of patterning the masking layer to form at least one opening therein to expose the substrate and form a recess region in the substrate, oxidizing the recess region to form a first oxide layer thereon to round the top corner of the recess region, and successively etching the first oxide layer and the substrate under the opening to form the trench in the substrate.

However, in RD 441003, an oxide layer for rounding corners is formed after the formation of a shallow trench. RD 441003 fails to teach or suggest forming a recess region for oxidation in the substrate before the formation of the trench. In particular, it is noted that in RD 441003, the substrate is etched only once for trench formation.

In Yoo et al, a bird's beak field oxide layer 42 is grown on an exposed substrate surface for protecting the top corner. Yoo et al, however, fail to teach or suggest etching a recess region in the substrate before the formation of bird's break filled oxide layer 42. See Figs. 5-6 and column 4, lines 32-40 of Yoo et al. It is likewise noted that in Yoo et al, the trench is etched only once for trench formation.

As none of the cited references, whether taken alone or in combination, teach or suggest etching a recess region for oxidation in the substrate before the formation of the trench as set

forth in claims 1 and 13, it is Applicant's belief that a *prima facie* case of obviousness cannot be established in connection with these claims. Furthermore, as it is Applicant's belief that a *prima facie* case of obviousness is not established for claims 1 and 13, the Examiner's arguments in regard to the dependent claims are considered moot and are not addressed here. Allowance of claims 1-20 is respectfully requested.

Foreign Priority Claim

Acknowledgment of Applicant's claim to foreign priority under 35 USC 119(a)-(d) or (f) and receipt of the certified copies of the priority document(s) is respectfully requested.

Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

Respectfully submitted,

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